Wireless Strain Sensing System for Space Structural Health Monitoring

Problem Statement

- There are currently no lightweight wireless strain sensors for space structural health monitoring (SSHM).
- This flight opportunity will demonstrate an ultra-low powered wireless strain sensing system in various gravity environments, particularly the transition to zero gravity.
- The matured technology can provide quality structural health monitoring capability and will offer critical support to the space shuttle's safety of flight which is essential to recertification of ISS structures.

Technology Development Team

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- Funding from University of Texas at Arlington Mechanical and Aerospace Department

- Triumph Aerospace Systems is eager to invest in this flight technology.

Proposed Flight Experiment

Experiment Readiness:

- June 2013

Test Vehicles:

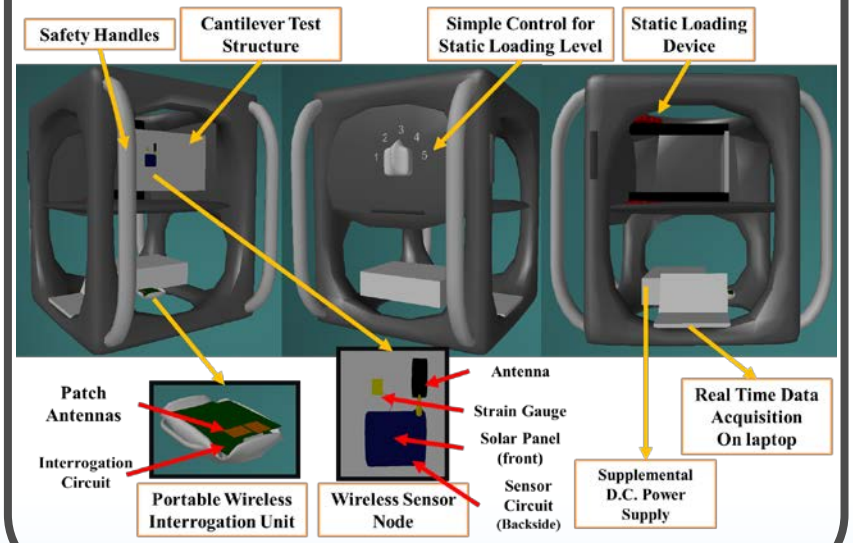
- Parabolic Flight Opportunity

Test Environment:

- The various gravity levels provided by the Flight Opportunity Program will assist the understanding of the system performance, constraints, and advancement of the TRL.

Test Apparatus Description:

- The wireless strain sensing system will be incorporated onto a structural static test apparatus. The apparatus can be also be transformed into a structural dynamic test apparatus.



Technology Maturation

- The integration of the data acquisition hardware with the computer software and the automation of the entire data acquisition process is required for the exit of current TRL 4. This can be done within one month of proposal submission.
- The successful parabolic flight is expected to help the payload advance through TRL 5. Some system adjustments can be made based on the flight experience.

Objective of Proposed Experiment

- The structural static and dynamic measurements on the metallic structure will be done in real time during the various gravity levels in flight.
- Collected strain data will be analyzed and compared to the vibration/static structural test data on the ground.
- Expected flight data will evaluate the effects of the parabolic flight profile on the performance of the wireless strain sensing system.

Technology Areas TA1, TA2, TA8, TA12, TA13 are related beneficiary subjects.